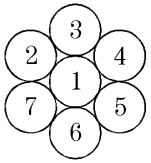
April, 2020

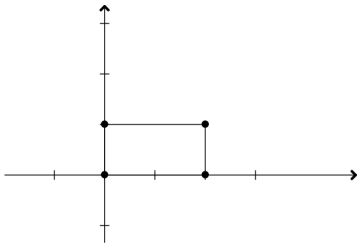
Monday	Tuesday	Wednesday	Thursday	Friday
		1 How many seven digit numbers can be formed by choosing any digit in the diagram and then proceeding to neighboring digits, one after another, in such a way that each of the seven digits is used exactly once? For example, 4561723 is such a number, but 7143256 is not. 	**2** A 4 by 4 grid has a zero in each of its four corners. How many different ways are there to fill in the remaining twelve positions with the integers 1 through 12, with each digit used exactly once and with both conditions (i) and (ii) satisfied?	**3** In magic squares, the sum of the numbers in each row, each column, and each diagonal is constant. For the given magic square find the value of B. 19 A 14 10 B C D E 11
6 Arnold earned a 78 on his essay, had a 98 on his mid term, but his class participation grade was a 70. If the essay and mid term are each worth 20% of his grade, and class participation is 30%, what grade must he make on his final exam to get an average of 85?	**7** Determine the number of ways FIRST can be "spelled out" (moving from an F left, right, or down one letter at a time until T is reached.) F F I F F I R I F F I R S R I F F I R S T S R I F	**8** A rectangular floor measures a feet by b feet, where a and b are positive integers with $b > a$. An artist paints a rectangle on the floor with the sides of the rectangle parallel to the sides of the floor. The unpainted part of the floor forms a border of width 1 foot around the painted rectangle and occupies half the area of the entire floor. How many possibilities are there for the ordered pair (a, b)?	**9** The average age of 5 people in a room is 30 years. An 18-year-old person leaves the room. What is the average age of the four remaining people?	**10** Six people are sitting in a room. When an 80-year old man enters the room, the average age of the people in the room doubles. What was the average age of the six people originally sitting in the room?
13 The diagram shows six congruent circles with collinear centers in the plane. Each circle touches its nearest neighbor(s) at exactly one point. How many paths of length 3π along the circular arcs are there from $A = (0, 0)$ to $B = (6, 0)$? 	**14** A purse contains 5 different coins, a penny, nickel, dime, quarter and 50¢ piece. How many different sums of money can be made using one or more coins?	**15** Three views of the same block are shown. What letter is on the side parallel to the side with the letter A? 	**16** What is the largest value S can have in a solution to the numerogram below in which each letter stands for a *distinct* digit? $\begin{array}{r} M\,O\,M \\ +\quad D\,A\,D \\ \hline 1\,S\,O\,N \end{array}$	**17** The Acme Sports Company has a number of sweatshirts in stock. The table shown here represents the number of sweatshirts in stock by color and size. Sweatshirt Inventory Color/Size | Small | Medium | Large Red | 12 | 23 | 17 Blue | 15 | 20 | 23 Green | 13 | 22 | 15 Martin wears a small sweatshirt and will not wear anything red. If a sweatshirt is selected at random, what is the probability that it will be an appropriate color and size for Martin?

20

If every person in a room shakes the right hand of every other person in the room, there are 36 possible handshakes. How many people are in the room?

21

A point (x, y) is selected at random from the rectangular region shown. What is the probability that $x < y$?



22

Given the following information: Of the 135,000 voters 56% were women. 52% of the women and 47.5% of the men voted for the Democrat. How many votes did the Democrat get?

23

How many ways can four people be arranged around a card table if the arrangements

$$\begin{matrix} & N & \\ W & & E \\ & S & \end{matrix}, \quad \begin{matrix} & W & \\ S & & N \\ & E & \end{matrix}, \quad \begin{matrix} & S & \\ E & & W \\ & N & \end{matrix}, \quad \begin{matrix} & E & \\ N & & S \\ & W & \end{matrix}$$

are all considered to be the same?

24

Evaluate: $\dfrac{6!}{3!\,5!}$

27

In the table shown, each x_i is a non-negative integer. The sum of the three numbers in each row of the table equals 30, as does the sum of the three numbers in each column of the table, as does the sum of the three numbers in each of the two diagonals of the table. What is the largest possible value of x_1 ?

x_1	x_2	x_3
x_4	x_5	x_6
x_7	x_8	x_9

28

If the operation ★ is defined by the equation $x \bigstar y = 2x + y$, what is the value of a in $2 \bigstar a = a \bigstar 3$?

29

An experiment consists of choosing with replacement an integer at random among the numbers from 1 to 9 inclusive. If we let M denote a number that is an integral multiple of 3 and N denote a number that is not an integral multiple of 3, which of the following sequences of results is least likely?

A. $M\ N\ N\ M\ N$

B. $N\ M\ M\ N\ M$

C. $N\ N\ M\ N$

D. $M\ N\ M\ M$

30

Thirty-six students took the ACT, with a mean score of 25.5. The boys had a mean score of 23.5, while the girls had a mean score of 28. How many girls were in the group?